Group 2 Electives

# CMPUT 250

* **Course Description:**  
  An interdisciplinary course for students in Science, Arts, and other faculties. The focus is on games as interactive entertainment, their role in society, and how they are made. Teams composed of students with diverse backgrounds (e.g. English, Art and Design, and Computing Science) follow the entire creative process: from concept, through pitch, to delivery, of a short narrative-based game using a commercial game engine. To achieve the required mix of backgrounds and experience, students must apply to be considered for this course. See the Department web site for the online form.
* **Prerequisite:** Second-year standing
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Matthew Guzdial (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The course CMPUT 250 is known for having a significant workload, with students reporting spending a considerable amount of time on midterms, finals, labs, and a group project. The tests and labs are considered relatively easy, but the group project's success depends on the team's dynamics. The average grade for the course is reportedly high, around 3.9, indicating that those who put in the effort can expect good grades. Additionally, for students taking on the music role in the game development project, the time spent on creating music can vary greatly depending on the game's requirements and the availability of royalty-free sources. While some programming knowledge can be helpful for creating specialized sounds, it is not a requirement for this role as RPG maker is used for the course. Overall, CMPUT 250 is a challenging course that requires a substantial time commitment.

# CMPUT 304

* **Course Description:**  
  The second course of a two-course sequence on algorithm design. Emphasis on principles of algorithm design. Categories of algorithms such as divide-and-conquer, greedy algorithms, dynamic programming; analysis of algorithms; limits of algorithm design; NP-completeness; heuristic algorithms.
* **Prerequisites:** CMPUT 204; one of STAT 151, 161, 181, 235, 265, SCI 151, or MATH 181; and one of MATH 225, 227, or 228
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The course CMPUT 304 is reported to be difficult by several students, with some expressing frustration over the teaching style of the professor. They suggest that the course material can be self-taught through resources like YouTube and StackOverflow, and that the professor's lectures may not provide a thorough understanding of the concepts. However, some students also mention that the course itself is low maintenance and that the homework and quizzes are straightforward. It is recommended that students have taken the prerequisite course CMPUT 204 before attempting CMPUT 304. The course covers topics such as design patterns, requirements analysis, and software architecture, which are known to be complex and require in-depth study. Overall, the course is described as challenging, but manageable with dedication and self-study.

# CMPUT 307

* **Course Description:**  
  An introductory course on the theory and applications of computer based 3D modeling and animation. The course will cover a selection of topics from overview of tools supporting modeling and animation, automatically generating 3D models, and animation of skeleton based models through algorithms and software. Applications of 3D modeling and animation in games, virtual/augmented environments, movies, and emerging video transmission algorithms will be discussed.
* **Prerequisites:** one of CMPUT 206, 308, or 411; or consent of the instructor
* **Terms the course is available in:**Winter Term 2024
* **Instructor(s):**Anup Basu (teaching in Winter Term 2024),
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:**307 is reported to be a more challenging and rewarding course compared to 366, with clearer and more specific assignments, and timely feedback. However, it may require a stronger foundation in computer science concepts.

# CMPUT 325

* **Course Description:**  
  A study of the theory, run-time structure, and implementation of selected non-procedural programming languages. Languages will be selected from the domains of functional, and logic-based languages.
* **Prerequisites:** CMPUT 201 and 204 or 275; one of CMPUT 229, E E 380 or ECE 212, and MATH 125
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Jia-Huai You (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The comments suggest that there have been instances of extreme stress and anxiety during exams in the course, indicating a potentially challenging academic environment.

# CMPUT 350

* **Course Description:**  
  This course focuses on state-of-the-art AI and graphics programming for video games. Part 1 introduces C++, the language of choice for video game engines, emphasizing efficiency, safety, the Standard Template Library, and OpenGL. Part 2 on real time strategy deals with efficient pathfinding algorithms, planning, and scripting AI systems. Student projects give hands-on experience directly applicable to the video games industry.
* **Prerequisites:** CMPUT 201 or 275, and 204
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The course CMPUT 350 is known for its challenging nature, with a heavy workload and complex topics. Students are advised to stay on top of the material, as there are many topics that can be related to other courses. The group project can be particularly difficult, with some students carrying others who don't want to do the work. The labs are described as weekly exams that can be difficult to pass. It is recommended to have a strong foundation in CS courses such as CMPUT 201, 275, and 204 before taking CMPUT 350. The assignments take a significant amount of time to complete, and students should be prepared for a challenging experience.

# CMPUT 366

* **Course Description:**  
  This course provides an introduction to search and planning in artificial intelligence. The course covers deterministic single-agent and multi-agent problems. Students will learn how to model real-world problems as state-space search problems and how to solve such problems. The course covers algorithms for solving deterministic shortest path problems with factored and non-factored states, combinatorial optimization problems, constraint satisfaction problems, and multi- agent problems.
* **Prerequisites:** CMPUT 204 or 275, and CMPUT 272
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024
* **Instructor(s):**Levi Santana de Lelis (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The comments suggest that CMPUT 366 is a challenging course that provides a strong foundation in AI algorithms and ideas. However, some people express doubts about its applicability in industry and suggest that it may be too advanced for undergraduate students. The absence of a respected professor, Dr. Sutton, is also a concern for some students. Overall, the course seems to have a mixed reputation, with some students praising it for its depth and others finding it disappointing.

# CMPUT 391

* **Course Description:**  
  This course covers the implementation of RDBMSs and some non- relational data models, along with their query languages. Topics: compilation, execution, and optimization of SQL queries; concurrent execution of transactions; indexing; advanced constructs in SQL; semi-structured data models and query languages; distributed and parallel databases; NoSQL and cloud-based database systems.
* **Prerequisites:** CMPUT 201 and 204, or 275; and CMPUT 291
* **Terms the course is available in:**No term decided yet/not offered this year
* **Instructor(s):**No instructor teaching the course
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The comments suggest that CMPUT 391 is a challenging course, with some students expressing concerns about the difficulty of the final exam and the potential for failing the class. The course covers the in-depth workings of a DBMS and includes topics such as table scans, joins, and various types of DBs. The professor, Barbosa, is known for making jokes in class but marking harshly. Some students have had negative experiences with the course in the past and advise against taking it unless one is very interested in databases. There have been concerns about the fairness of the final exam's weight in the overall grade and some students have attempted to voice their concerns to the faculty.

# CMPUT 404

* **Course Description:**  
  Introduction to modern web architecture, from user-facing applications to machine-facing web-services. Topics include: the evolution of the Internet, relevant technologies and protocols, the architecture of modern web-based information systems, web data exchange and serialization, and service-oriented middleware.
* **Prerequisites:** CMPUT 301 and 291, or consent of the instructor
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Hazel Campbell (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The course CMPUT 404 is considered to be quite difficult, with a heavy workload comparable to CMPUT 301. It covers topics such as JavaScript, Ajax, HTML/CSS, webservers, websockets, REST APIs, and Django/Flask backends using Python. The course is designed for newcomers and does not require prior experience, but the workload can be overwhelming for some. The professor, Hindle, is highly regarded and provides thorough explanations, but there may be strict deadlines. It is recommended to be proactive and start learning the necessary concepts beforehand. The course may be offered in different terms, so it is important to keep checking for availability.

# CMPUT 411

* **Course Description:**  
  2D and 3D transformation; 3D modeling and viewing; illumination models and shading methods; texture mapping; ray tracing.
* **Prerequisites:** CMPUT 204 or 275, 301; one of CMPUT 340, 418 or equivalent knowledge, and MATH 214
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Pierre Boulanger (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:**Insufficient information available on course difficulty

# CMPUT 415

* **Course Description:**  
  Compilers, interpreters, lexical analysis, syntax analysis, syntax- directed translation, symbol tables, type checking, flow analysis, code generation, code optimization.
* **Prerequisites:** one of CMPUT 229, E E 380, or ECE 212, and any 300-level Computing Science course
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The course CMPUT 415 is known for its high workload and significant project scope. It is recommended for students with an interest in compilers and software engineering. The course material is now in C++ and includes the use of important tools that make the assignments easier but also increase the expectation to complete the entire final project. The course consists of 4 projects, each ramping up in scale and sophistication, and there are 3 assignments and a midterm and final exam. The final project involves implementing a LLVM based compiler for a defunct IBM language. Preparation includes knowledge of Java and familiarity with Antlr and LLVM. The workload is intense and constant, and the course is considered the most challenging in the CMPUT program.

# CMPUT 466

* **Course Description:**  
  Learning is essential for many real-world tasks, including recognition, diagnosis, forecasting and data-mining. This course covers a variety of learning scenarios (supervised, unsupervised and partially supervised), as well as foundational methods for regression, classification, dimensionality reduction and modeling. Techniques such as kernels, optimization and probabilistic graphical models will typically be introduced. It will also provide the formal foundations for understanding when learning is possible and practical. Credit cannot be obtained for both CMPUT 367 and CMPUT 466.
* **Prerequisites:** CMPUT 204 or 275; MATH 125; CMPUT 267 or MATH 214; or consent of the instructor
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024
* **Instructor(s):**Bailey Kacsmar (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The course CMPUT 466 is considered to be quite challenging, with a heavy emphasis on calculus, statistics, and probability theory. Some students may find the programming portions to be difficult as well. However, there are alternative courses and resources available for those who may not have a strong math background or who prefer a more introductory approach to machine learning. The course is designed for beginners, but waivers for prerequisites may no longer be granted due to high demand. The final project is considered to be relatively easy and can be a fun way to apply machine learning methods to a dataset of interest. The exams are open-ended and require clear communication of ML concepts rather than memorization of formulas. It is recommended that students with a strong math background take the course, but alternatives are available for those who may struggle with the prerequisites.

# ECE 360

* **Course Description:**  
  Linear system models. Time response and stability. Block diagrams and signal flow graphs. Feedback control system characteristics. Dynamic compensation. Root locus analysis and design. Frequency response analysis and design. Credit may be obtained in only one of ECE 360, ECE 362, E E 357, E E 462 or E E 469.
* **Prerequisites:** ECE 203 or E E 250, and ECE 240 or E E 238
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Tongwen Chen (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:**442, the multimedia signal processing course, is reported to be the easiest on the list, according to some students. However, another student mentioned that they found the machine learning focused course 442 to be the most fun and interesting elective. The difficulty of the course may depend on the specific focus of the curriculum. It would be a good idea to ask for more information in the ECE labs discord or start a discussion on e-class.

# ECE 370

* **Course Description:**  
  Review of vector calculus, electrostatics, and magnetostatics. Electric and magnetic fields in material media, including polarization mechanisms and general boundary conditions. Solutions to static field problems. Maxwell's equations and waves in free space, dielectrics and conducting media. Reflection and refraction, standing waves. Credit may be obtained in only one of ECE 370 or E E 315.
* **Prerequisites:** MATH 102, 209 and PHYS 230
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The course ECE 370 is reportedly difficult by some students, with comments mentioning a professor who does not teach effectively, does not provide proper resources, and grades harshly. The textbooks used for the course may vary, with some focusing on integral forms of Maxwell's equations and others on differential forms. Students have reported struggling with the material and finding the exams challenging, with some expressing uncertainty about the existence of solutions to certain problems. However, it is generally believed that passing the course is achievable as long as one puts in the effort and writes out equations, assumptions, and diagrams.

# ECE 380

* **Course Description:**  
  Basics of analog communication: amplitude, angle, and analog pulse modulation; modulators and demodulators; frequency multiplexing. Basics of digital communication: sampling, quantization, pulse code modulation, time division multiplexing, binary signal formats. Credit may be obtained in only one of ECE 380 or E E 390.
* **Prerequisite:** ECE 240 or E E 238
* **Terms the course is available in:**Winter Term 2024, Fall Term 2024, Winter Term 2025
* **Instructor(s):**Xingyu Li (teaching in Winter Term 2024), Instructor(s) undecided for Fall Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 405

* **Course Description:**  
  Introduction to the principles of biophysical instrumentation. Various sensors are examined including strain gauges, inductive, capacitive, thermal, and piezoelectric sensors. Methods of measuring blood pressure are discussed. Origin of biopotentials; membrane and action potentials. Measurement of bioelectrical signals such as the ECG and EMG. Electrical safety, noise, impedance matching, and analog-to-digital conversion. Applications of electrodes, biochemical sensors, and lasers. Credit may be obtained in only one of ECE 405 or EE BE 512.
* **Prerequisite:** ECE 203 or E E 250 or consent of the Instructor
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** ECE 405, Biophysical Instrumentation and Measurement, is a very rarely taken course with fewer than 50 students enrolled per semester for over a dozen years. The course is known for its theoretical questions and calculations on assignments and exams, making it a challenging experience for students. However, the content is reportedly interesting in applications.

# ECE 406

* **Course Description:**  
  This course is intended to enable individuals or a small group of students to study topics in their particular field of interest under the supervision of a member of the Department of Electrical and Computer Engineering or the Department of Computing Science or other appropriate departments.
* **Prerequisites:**None
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 407

* **Course Description:**  
  This course is intended to enable individuals or a small group of students to study topics in their particular field of interest under the supervision of a member of the Department of Electrical and Computer Engineering or the Department of Computing Science or other appropriate departments.
* **Prerequisites:**None
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Instructor(s) undecided for Winter Term 2024, Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 423

* **Course Description:**  
  Topics include distributed communication models (e.g., sockets, remote procedure calls, distributed shared memory), distributed synchronization (clock synchronization, logical clocks, distributed mutex), distributed file systems, replication, consistency models, fault tolerance, QoS and performance, scheduling, concurrency, agreement and commitment, Paxos-based consensus, MapReduce and NoSQL datastores, cloud infrastructures and microservices.
* **Prerequisites:** CMPUT 379 and (ECE 487 or CMPUT 313)
* **Terms the course is available in:**No term decided yet/not offered this year
* **Instructor(s):**No instructor teaching the course
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 440

* **Course Description:**  
  Extension of sampling theory and the Fourier transform to two dimensions, pixel operations including gray-level modification, algebraic and geometric transformations. The design of spatial filters for noise reduction, image sharpening and edge enhancement, and some discussion of interpolation techniques. An introduction to the concepts of image restoration from known degradations and the reconstruction of images from parallel and fan projections. Credit may be obtained in only one of EE BE 540 or ECE 440.
* **Prerequisite:** ECE 340 or E E 338 or consent of Instructor
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 442

* **Course Description:**  
  Human visual/audio perception and multimedia data representations. Basic multimedia processing concepts, multimedia compression and communications. Machine learning tools for multimedia signal processing, including principle component analysis and Gaussian mixture modeling. Applications to human-computer interaction, visual-audio, and visual-text processing. Credit may be obtained in only one of ECE 442 or E E 442.
* **Prerequisites:** ECE 220 or CMPUT 275, ECE 342, MATH 102 or equivalent knowledge
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Li Cheng (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:**Insufficient information available on course difficulty

# ECE 447

* **Course Description:**  
  The course introduces basic concepts and techniques of data analysis and machine learning. Topics include: data preprocessing techniques, decision trees, nearest neighbor algorithms, linear and logistic regressions, clustering, dimensionality reduction, model evaluation, deployment methods, and emerging topics.
* **Prerequisites:** ECE 220 or CMPUT 275, and ECE 342 or STAT 235, or consent of instructor
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Marek Reformat (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**The professor does not have a rating on Rate My Professor
* **Course Difficulty:** The course ECE 447 is a new introduction to machine learning, with a great professor and relatively easy assessments. However, the organization of the course may be disorganized. The course provides a basic introduction to machine learning and hands-on experience with data analysis. The programming aspect of the course is not too challenging for those with a software background. Overall, the course is considered fairly easy.

# ECE 449

* **Course Description:**  
  Intelligent systems for automatic control and data analysis. The concepts of vagueness and uncertainty, approximate reasoning, fuzzy rule-based systems and fuzzy control. Strategies for learning and adaptation, supervised and reinforcement learning, self-organization and the selection of neural network architectures. Discussion of the principles of search and optimization, evolution and natural selection and genetic algorithms. Introduction to hybrid intelligence. Applications of intelligent systems for pattern recognition, classification, forecasting, decision support, and control. Credit may be obtained in only one of CMPE 449 or ECE 449.
* **Prerequisites:**None
* **Terms the course is available in:**Fall Term 2024
* **Instructor(s):**Instructor(s) undecided for Fall Term 2024
* **Instructor ratings:**No professors teaching this term, so no ratings available at all
* **Course Difficulty:** The comments suggest that ECE 449 is primarily a programming course, with minimal need for lab equipment. However, for capstone projects, some components may be required. The overall difficulty of the course is likely to be moderate, with a focus on coding and problem solving.

# ECE 455

* **Course Description:**  
  Microfluidic and nanobiotechnological devices. Fabrication techniques for devices: self-assembly, lithographic technologies. Applications of nanobiotechnology in computing, electronics, human health, environment and manufacture. Credit may be obtained in only one of ECE 455 or E E 455.
* **Prerequisites:** MATH 201 or PHYS 230
* **Terms the course is available in:**Winter Term 2024, Winter Term 2025
* **Instructor(s):**Xihua Wang (teaching in Winter Term 2024), Instructor(s) undecided for Winter Term 2025
* **Instructor ratings:**Xihua Wang's Rate My Professor rating is 4.5/5
* **Course Difficulty:** Based on the comments, ECE 455 is considered to be a challenging course. Some students have reported that it is difficult enough to require in-person advising to graduate. One student's friend described it as "absolute ass." However, there is also mention of a group II elective, 442, which is considered to be easier and more enjoyable. The specific topic of 442 is multimedia signal processing.